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[redacted]

SEVENTH MONTHLY NARRATIVE REPORT

15 February 1966

REFERENCE

25X1 [redacted]

25X1 [redacted] Job No. 645

REPORTING INTERVAL

10 January 1966 - 10 February 1966

OBJECTIVE [1]

The objectives of this program are: to define the operational objectives for automatic screening of photographic intelligence data; to study, test and evaluate the techniques applicable to the problem; and to generate a design for an operational prototype system. Extensive experimentation on existing scanning and processing equipment, coupled with computer simulations of recognition systems, will be used to test the feasibility of several schemes. The final design will be based upon results of the techniques study and the operational objective defined in the program.

STATUS OF ACTIVITIES AND ACCOMPLISHMENTS

During the reporting period, work continued on the analysis of the performance of the Integral Scanner and on frequency domain analysis in memorization and generalization experiments. In

1. Work on the first and third objectives were discontinued in December in order that emphasis could be placed on the second.

memorization experiments we process, at standard orientation (zero rotation and translation), images from two classes of targets in our equipment. The decision program is trained with the parameters extracted from these images. The parameters from rotated and translated images are then processed in the decision logic. In generalization experiments, the device is trained with parameters from two classes of images at standard orientation and tested with parameters from the second set. Of the two, the generalization experiments are more difficult to set up because all training and testing samples must have the same orientation when the image is centered in the equipment. During this program, the stress is not on the absolute recognition rate but on the invariance of this rate to rotation and translation. Recognition rates can always be improved by modifications to existing equipment, whereas invariance must be a fundamental part of the approach.

Simple error calculation will not be sufficient for analysis of the experimental results. The generalization and memorization experiments must be analyzed for invariance under rotation and translation, invariance between the target classes, and constancy of recognition rate. The Chi square test has been chosen for the analysis because it is robust, it is suitable for the categorical variables we are using, and it requires no knowledge of the distribution of the output data.

We have received some imagery of Army manuevers at Camp Drum and have requested, but have not received, imagery from the Navy. Our imagery now includes a roll from SEG, of cultured targets near Shaw AFB, and a collection from the Army, of images of Camp Drum, which have been made into slides. Because examples in any one class are lacking, most of the experiments are to separate

man-made objects from background.

During the reporting period, we have increased the total number of processed images to 3,000. In most of our memorization experiments, the Chi-square tests have shown no significant effects from rotation or translation on the recognition of the images. However, full analysis must wait until the remaining 2,000-3,000 images are processed.

DIFFICULTIES ENCOUNTERED

We have not received any imagery from the Navy. The SDS 925 computer has been unreliable during the last month and has slowed our progress because our research requires the decision program in this computer.

PROGRAM FOR NEXT INTERVAL

During the next reporting interval the experiments will continue in two- and four-class programs, test imagery will be selected from the [redacted] film library, and the final report will be written and published.

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